Claims

1. A method for combining at least two time-division multiplex signals (S1, S2) to form a resulting time-division multiplex signal (S3), all having the same maximum number N of periodic time-division multiplexed channels, wherein a reciprocal time displacement of the content (X, Y) from occupied channels in the time-division multiplex signals (S1, S2) allows a reassignment of the content (X, Y) to unoccupied channels of the time-division multiplex signals (S1, S2) to be controlled, such that their combining into the resulting time-division multiplex signal (S3) is collision-free.

2. The method as claimed in claim 1, characterized in that with common time correspondence of occupied channels (GBK) in both time-division multiplex signals (S1, S2), the content of one of the commonly occupied channels (GBK) is branched from one of the time-division multiplex signals (S1, S2) and temporally displaced until it corresponds temporally to a channel (NGBK) that is not occupied in a common manner by both time-division multiplex signals (S1, S2), such that the combining of both time-division multiplex signals (S1, S2) takes place in a collision-free manner within the N time-division multiplexed channels of the resulting time-division multiplex signal (S3).

3. The method as claimed in claim 1, characterized in that after the time displacement of the branched content (X), the content (X) is inserted into one channel of the time-division multiplex signals (S1, S2) and both time-division multiplex

signals (S1, S2) are then optically coupled.

4. The method as claimed in one of the preceding claims, characterized in that with a number N1 of occupied channels of the first time-division multiplex signal (S1) and with a number N2 of occupied channels of the second time-division multiplex signal (S2) the total number N1+N2 does not exceed the number N of channels of the resulting time-division multiplex signal (S3).

5. The method as claimed in one of the preceding claims, characterized in that with the number N, which is provided as a multiple of 4, of time-division multiplexed channels at least N/4 branches or reinsertions and N/4+1 time displacements are used for content (X, Y) of the channels of both time-division multiplex signals (S1, S2).

6. The method as claimed in one of claims 4 or 5, characterized in that if the total number N1+N2 exceeds the number N of channels of the resulting time-division multiplex signal (S3), superfluous commonly occupied channels (SK1) of one of the time-division multiplex signals (S1, S2, S11, S21) are diverted and combined to form a further time-division multiplex signal (S1i).

7. The method as claimed in claim 6, characterized in that during diversion of the superfluous commonly occupied channels a granularity characteristic is modified, such that these channels and the further time-division multiplex signal (S1i) are combined with the same granularity characteristics.

8. The method as claimed in claim 7, characterized in that wavelength is selected as the modified granularity.

9. The method as claimed in one of claims 5 to 8, characterized in that the most identical number possible of channel-related branches, time displacements, reinsertions and optionally diversions is used for each time-division multiplex signal (S1, S2).

10. The method as claimed in one of the preceding claims, characterized in that for commonly occupied and unoccupied channels (GBK, GNBK) in particular the occupancy of channels of both time-division multiplex signals (S1, S2) is identified before a channel is branched.

11. The method as claimed in claim 10, characterized in that further identifications are carried out in respect of occupancy of the channels before further channel branching.

12. The method as claimed in one of claims 10 and 11, characterized in that occupancy is identified from information from a network manager.

13. The method as claimed in one of claims 10 and 11, characterized in that occupancy is identified from an extracted light element of one of the time-division multiplex signals (S1, S2), being overlaid optically (K1, K2) with a control pulse (PS)

synchronized with the time-division multiplex signal and the overlaid signal is output to an avalanche photodiode (D1, D2) or a non-linear detection element, whose output signal provides information (KS) about the occupancy of a channel.

14. The method as claimed in claim 13,
characterized in that
the bit rate of the control pulse is tailored to the bit rate of the time-division multiplex signals and the control pulse is gradually subjected to a time delay.

15. The method as claimed in one of claims 10 and 11,
characterized in that
occupancy is identified by demultiplexing the time-division multiplex signals (S1, S2), whose bandwidth is at least half the bandwidth of the time-division multiplex signals (S1, S2).

16. The method as claimed in one of the preceding claims,
characterized in that
phases of the time-division multiplex signals (S1, S2) are synchronized before the first branching of a content of their channels.

17. The method as claimed in one of the preceding claims,
characterized in that
a clock pulse of the branch(es) and one or more necessary time delays are constantly checked and regulated.

18. The method as claimed in one of the preceding claims,
characterized in that
during the combining of both time-division multiplex signals (S1, S2) clock pulse synchronization is checked and regulated.

19. An arrangement for combining at least two time-division multiplex signals (S1, S2) to form a resulting time-division multiplex signal (S3), all having the same number N of periodic time-division multiplexed channels,
wherein a controller (CTRL) is connected to at least one time delay element (T1, T2 or T3, T4) provided for a time-division multiplex signal (S1, S2) for the reciprocal time displacement of content (X, Y) from occupied channels in the time-division multiplex signals (S1, S2),
to reassign the content (X, Y) to unoccupied channels of the time-division multiplex signals (S1, S2) the controller (CTRL) is configured such that with an optical coupler (KO) connected downstream from the time delay element (T2 or T4) combining into the resulting time-division multiplex signal (S3) takes place in a collision-free manner.

20. The arrangement as claimed in claim 19,
characterized in that
both time-division multiplex signals (S1, S2) have some occupied and unoccupied channels with common time correspondence (GBK, GNBK),
to branch a content (X, Y) of an occupied channel with common time correspondence (GBK) of one of the time-division multiplex signals (S1, S2), the time-division multiplex signal (S1, S2) is fed into a drop module (OADM1, OADM2 or OADM3, OADM4), the drop connection of which is connected to the time delay element (T1, T2 or T3, T4) for time displacement of the branched content of the channel and
the controller (CTRL) is connected to the drop module (OADM1, OADM2 or OADM3, OADM4) and the time delay element (T1, T2 or T3, T4) via control signals (SS, SS1, SS2) to activate such branching and to set the time delay.

21. The arrangement as claimed in one of claims 19 to 20, characterized in that
a detection unit (DE, PS, K1, K2, D1, D2) is connected to the controller (CTRL) via a control signal (KS) to identify the occupancy of channels with time correspondence between or during time-division multiplex signals (s1, S2).

22. The arrangement as claimed in one of claims 19 to 20, characterized in that
to identify the occupancy of channels with time correspondence between or during time-division multiplex signals (S1, S2), a network manager is connected to the controller (CTRL) via a control signal (KS).

23. The arrangement as claimed in one of claims 19 to 22, characterized in that
where a number of time-division multiplex signals (S1, S2) are to be combined, one of the time-division multiplex signals (S1, S2) is fed to at least one input of a drop module (OADM1, OADM2 or OADM3, OADM4) with a time delay element (T1, T2 or T3, T4) connected to a drop output.

24. The arrangement as claimed in one of claims 23 [sic], characterized in that
an insertion facility (EK1, EK2 or EK3, EK4) is connected downstream from each time delay element (T1, T2 or T3, T4) for reinsertion of a branched and time-delayed content of a channel into its original time-division multiplex signal (S1, S2),
an optical coupler (KO) is connected downstream from the last arranged insertion facilities (EK2, EK4) for each time-division multiplex signal(S1, S2) to combine the time-division

multiplex signals (S1, S2) with collision-free content.

25. The arrangement as claimed in one of claims 19 to 24, characterized in that the controller (CTRL) has a counter for the occupied and unoccupied channels with common time correspondence (GBK, GNBK) of the time-division multiplex signals (S1, S2) to be combined.

26. The arrangement as claimed in one of claims 19 to 25, characterized in that the controller (CTRL) has a unit to assign one of the occupied channels with common time correspondence (GBK) to one of the unoccupied time channels with common time correspondence (NGBK) of the time-division multiplex signals (S1, S2) to be combined.

27. The arrangement as claimed in one of claims 19 to 26, characterized in that control means (T0, K0) are present for the phase and clock pulse of the time-division multiplex signals (S1, S2).

28. The arrangement as claimed in one of claims 20 to 27, characterized in that if there is a collision risk in respect of the content (X, Y), a drop module (OADM5) is connected upstream from one of the add-drop modules (OADM1, OADM3).

29. The arrangement as claimed in one of claims 20 to 28, characterized in that a wavelength converter and/or switch (λ-KON) is connected to a drop output of the drop module (OADM5), such that a new wavelength is allocated to the channels of content (X, Y) with

collision potential.

30. The arrangement as claimed in claim 29, characterized in that the channels with a new wavelength are fed into a further connected arrangement as claimed in one of claims 20 to 29 as a new time-division multiplex signal to be combined.